

SUPPORT FOR THE AMENDMENTS

The amendment to the paragraph beginning on page 27, line 29, in the specification corrects an obvious error. There is no x index in formula III.

The amendments of Claim 1 correct the Formulae to show all bonds necessary to describe the tetravalency of carbon.

Claim 1 is also amended to use wording and structure consistent with U.S. patent law practice.

No new matter is believed added to this application by entry of this amendment.

Claims 1-17 are active.

REMARKS/ARGUMENTS

The claimed invention provides a lubricant composition as described in Claim 1 and claims dependent thereon, for modern gearboxes, engines and hydraulic pumps which contains highly effective friction modifying additives that are stable to oxidation and thermal stress, have increased solubility in nonpolar lubricant oils and improve the flow properties of the lubricant oil.

The rejection of Claims 1-9, 13-14 and 17 under 35 U.S.C. 103(a) over Mishra et al. (U.S. 5,834,408) is respectfully traversed.

Mishra describes an acrylic copolymer obtained by anionic polymerization of the following acrylic monomers:

- a) 0-60% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_1$ wherein R_1 is C_{1-5} alkyl;
- b) 0-60% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_2$ wherein R_2 is C_{6-14} alkyl; and
- c) 15-80% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_3$ wherein R_3 is C_{15-22} alkyl. (Claim 1)

At least one of a) and b) is present and the total amount of a) and b) is from 20-85 weight per cent. Mishra requires a polydispersity index of from 1 to 1.5. Other monomers may be

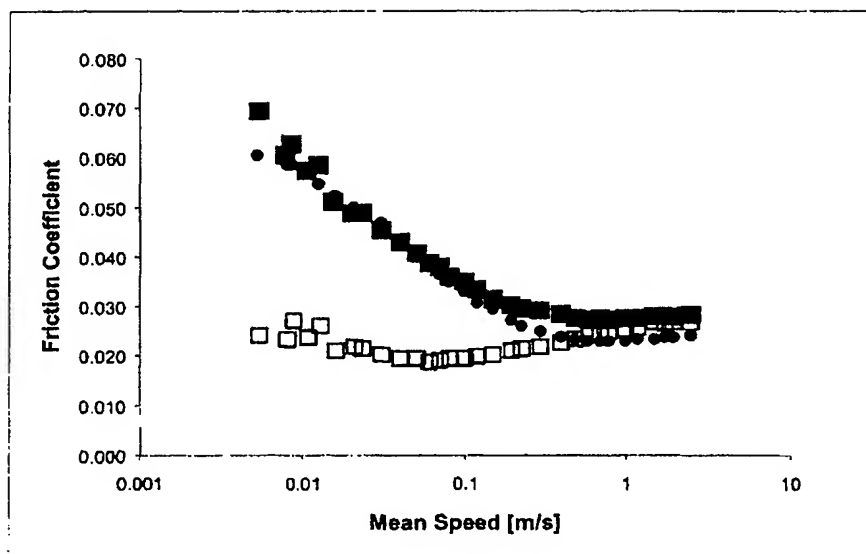
added to the polymerization (Col. 3, lines 20-39). The polymer may be random or block (Col. 4, lines 9-11). However, in order to obtain the desired polydispersity random polymers are preferred (Col. 4, lines 31-34).

The Office has noted that a) corresponds to formula I of the present invention and both b) and c) correspond to formula II (Official Action dated May 13, 2009, page 4, lines 2, 8 and 13). The Office has also pointed to Col. 3, lines 27-39 of the reference as reading on formula III (Official Action dated May 13, 2009, page 5, lines 1-2).

Applicants note that Mishra does not require a copolymer containing both a) and c) and in fact the reference copolymer could consist of all b) and c) (corresponding to formula II of the present invention). Nowhere does this reference disclose or suggest that a) must be present. Applicants also note that Mishra provides no examples of block copolymers. All the examples shown in Table 1 are random (Col. lines 49-54) copolymers and no examples containing polar monomers of formula III of the present invention are provided. Furthermore, nowhere does Mishra disclose or suggest that the copolymer be of the block type wherein the polar component is present in a block of at least three repeating units as according to the claimed invention (Claim 1; formula III, n is 3 or more).

Applicants respectfully submit that nowhere does this reference disclose or suggest that a **block copolymer** as according to the claimed invention would provide the significant and unexpectedly reduced Friction Coefficient values at low mean speed shown in Figures 2-5 of the specification. Figure 2 shows the Friction Coefficient of a block copolymer of a hydrophobic segment comprising methyl methacrylate and a mixture of long chain (C₁₂ to C₁₅) methacrylates and a polar segment of N-(3-Dimethylaminopropyl)methacrylamide compared to a random copolymer of the same monomer composition. Figure 2 is reproduced below for the Examiner's convenience.

Figure 2:



Frictional values of Example 5 (□), Comparative Example 5 (■) and Comparative Example 11 (●)

Applicants state:

“Figure 2 shows that the lubricant which comprises the VI improver according to Example 1 has a distinctly reduced frictional value from a speed of 0.4 m/s. The frictional profile of the Stribeck curve is shifted to lower speeds to such an extent that, within the measuring capabilities of the mini traction machine down to 0.0056 m/s, no significant rise in the coefficient of friction can be observed. In the speed range between 0.4 and 0.04 m/s, a slight lowering in the coefficient of friction with falling speed is even achieved.” (Page 49, lines 19-29)

Applicants respectfully submit that Mishra does not disclose, suggest or provide motivation that would have led one of ordinary skill in the art at the time of the invention to expect the significant reduction in friction at low speed range obtained with the specific composition according to the claimed invention. Nowhere does this reference discuss or infer that a block copolymer would provide the performance obtained with the claimed invention. In fact, Mishra states (Col. 4, lines 37-40):

The comonomers are preferably added in one-shot (at-once) as a single amount or rapidly added as a single stream.

Evidence that a compound is unexpectedly superior in one of a spectrum of common properties . . . can be enough to rebut a *prima facie* case of obviousness. (*In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987))

A *prima facie* case of obviousness based on structural similarity is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) [MPEP § 2145 VII.]

Applicants submit that nowhere does Mishra disclose or suggest that significant improvement in frictional value at low speeds could be obtained by employing the block copolymer composition according to the claimed invention. In contrast, Applicants have shown significant improvement in friction reduction at low speeds due to use of a block copolymer according to the present invention in the examples in the specification.

Applicants note the Examiner's comments in the Advisory Action of August 28, 2009, that Mishra allows for block copolymers (Continuation sheet, lines 8-9). Applicants respectfully point out that Mishra describes an almost infinite range of structures having random or block structure and varying combinations of a), b) and c) units.

The MPEP § 2144.05 I. states:

However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus.

The MPEP further references *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994) which states:

Given the vast number of diphenols encompassed by the generic diphenol formula in Knapp, and the fact that the diphenols that Knapp specifically discloses to be "typical," "preferred," and "optimum" are different from and more complex than bisphenol A, we conclude that Knapp does not teach or fairly suggest the selection of bisphenol A. See *In re Belle* 991 F.2d 781, 26

USPQ2d 1529 (Fed. Cir. 1993) (DNA sequence would not have been obvious in view of prior art reference suggesting a nearly infinite number of possibilities and failing to suggest why among all those possibilities one would seek the claimed sequence). A disclosure of millions of compounds does not render obvious a claim to three compounds, particularly when that disclosure indicates a preference leading away from the claimed compounds.

Applicants respectfully submit that the reference describes a comparatively large range of polymer compositions and does not recognize the specific structural and composition limitations described in the claimed invention.

In view of all the above, Applicants submit that Mishra cannot render the claimed invention obvious and withdrawal of the rejection of Claims 1-9, 13-14 and 17 under 35 U.S.C. 103(a) over Mishra is respectfully requested.

The rejection of Claims 10-12 under 35 U.S.C. 103(a) over Mishra in view of Pappas et al. (U.S. 3,816,314) is respectfully traversed.

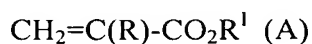
Claims 10-12 all depend directly or indirectly from Claim 1 and therefore include the description of the independent claim. The deficiencies of Mishra with respect to Claim 1 have been described above.

The Office has indicated that Mishra discloses monomer with hydrophobic segments and monomers with polar segments (Official Action dated May 13, 2009, page 6, lines 1-2). Applicants again point out and the Office apparently recognizes that Mishra does not disclose or suggest a block copolymer structure having a polar block with 3 or more repeating units. The Office does acknowledge that (Official Action dated May 13, 2009, page 6, lines 2-5):

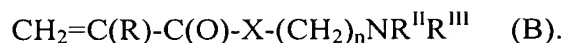
Mishra does not, however, disclose a concentration range for the monomers with polar segments and therefore Mishra does not disclose a weight ratio between the two segments. Mishra also does not explicitly disclose weight average degree of polymerization of the hydrophobic or polar segments.

Pappas is cited to show a weight ratio of polar and nonpolar segments.

Pappas describes an oil additive which is an oil soluble block copolymer of a comonomer A of the formula:



and comonomer B of the formula:



R^I in formula (A) is a C₈ to C₂₂ substantially straight chain alkyl group. Nowhere does this reference disclose or suggest a lubricant composition comprising a block copolymer according to the claimed invention where the hydrophobic segment P comprises one or more ethylenically unsaturated ester compounds of formula (1) where R^I is a linear or branched alkyl radical having 1 to 5 carbon atoms and one or more ethylenically unsaturated ester compounds of formula (11) where R⁴ is a linear or branched alkyl radical having 6 to 30 carbon atoms.

In view of the above, Applicants respectfully submit that the cited reference cannot cure the deficiency of Mishra previously described and therefore the cited combination of references cannot render the claimed invention obvious. Accordingly, withdrawal of the rejection of Claims 10-12 under 35 U.S.C. 103(a) over Mishra in view of Pappas is respectfully requested.

The rejections of Claims 15 and 16 under 35 U.S.C. 103(a) over Mishra in view of Nesvadba et al. (U.S. 2004/0242813) and Benicewicz et al. (U.S. 2003/0060577) respectively, are respectfully traversed.

Applicants respectfully note that Claims 15 and 16 depend from Claim 1. The deficiency of the primary reference was described above.

Nesvadba is cited to show an initiator with a transferable atom group.

Nesvadba describes a process for the preparation of hydroxyl-vinyl-aromatic polymers by anionic radical polymerization (Abstract). Nowhere does this reference disclose

or suggest a block copolymer according to Claim 1 and therefore, Nesvadba cannot cure the deficiency of the primary reference.

Benicewicz is cited to show a dithiocarboxylic ester.

Benicewicz describes a process for preparing dithiocarboxylic esters. This secondary reference is not directed to the preparation of block copolymers according to Claim 1 of the present invention and therefore cannot cure the deficiencies of the primary reference.

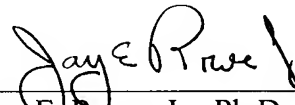
In view of the above, Applicants submit that the cited combinations of references cannot render the claimed invention according to Claims 15 and/or 16 obvious and withdrawal of the rejections of Claims 15 and 16 under 35 U.S.C. 103(a) over Mishra in view of Nesvadba and Benicewicz respectively, are respectfully requested.

The objection to Claim 1 is believed obviated by appropriate amendment. Formula (III) is herein corrected by amendment. Withdrawal of the objection is respectfully requested.

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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